

(12) UK Patent Application (19) GB (11) 2 343 616 (13) A

(43) Date of A Publication 17.05.2000

(21) Application No 9824745.5

(22) Date of Filing 11.11.1998

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(51) INT CL⁷

A47L 9/02

(52) UK CL (Edition R)

A4F FSNX

(56) Documents Cited

WO 97/29675 A US 4475265 A US 4413372 A

(58) Field of Search

UK CL (Edition R) A4F FK FSLA FSLX FSNS FSNX

INT CL⁷ A47L 7/00 9/00 9/02 9/06

Online: PAJ, EPODOC, WPI

(54) Abstract Title

Cleaning heads for suction cleaners, and adaptors for use therewith

(57) A cleaning head for cleaning surfaces of fabric and like absorbent materials is provided with a removable adaptor 40 for assembly with the head. The cleaning head comprises a plurality of spaced liquid delivery passageways 30 for delivering a cleaning liquid to the surface to be cleaned, an air passage (17) extending through the head and having an open suction mouth (25) adjacent to said liquid delivery passageways 30 for applying suction to said surface for the collection of liquid from the surface to enable the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface. The adaptor 40 effectively covers the liquid passageways and fits within said mouth (25) and includes an inlet opening (49) which maintains communication between the surface and the air passage (17) to enable the head to be operated in a dry mode to pick up solid matter from said surface. The adaptor 40 may cover the liquid passageways 30 by means of a flange 44 and may have a pair of baffles (48) which extend between the forward and rearward walls 41, 42 and converge inwardly and upwardly from openings 47a in end walls 47 towards the inlet opening (49). The cleaning head may be part of a vacuum cleaner.

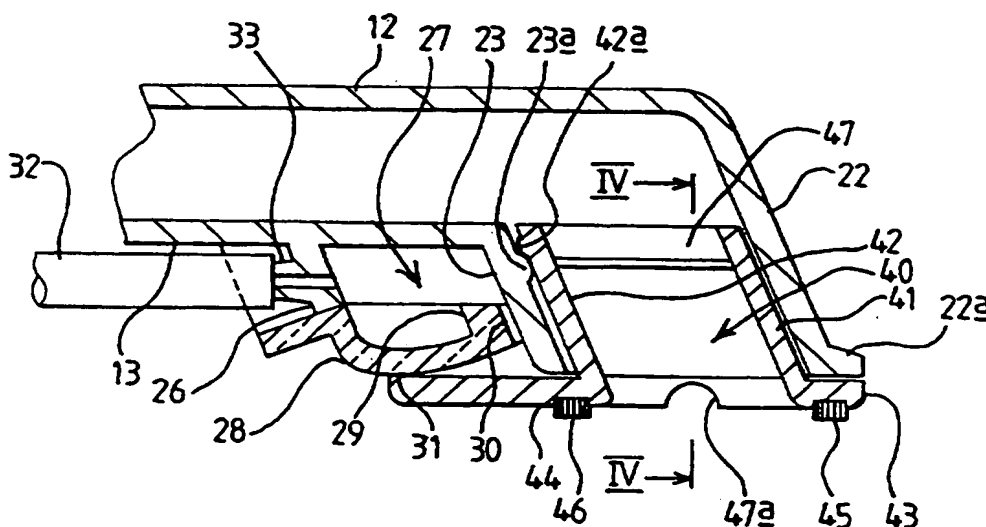


FIG 3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy. The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995. This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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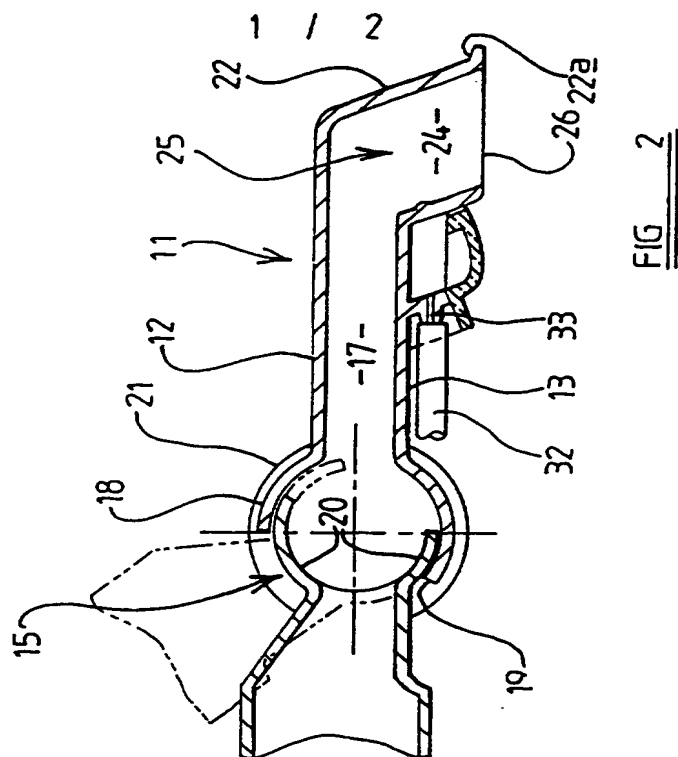
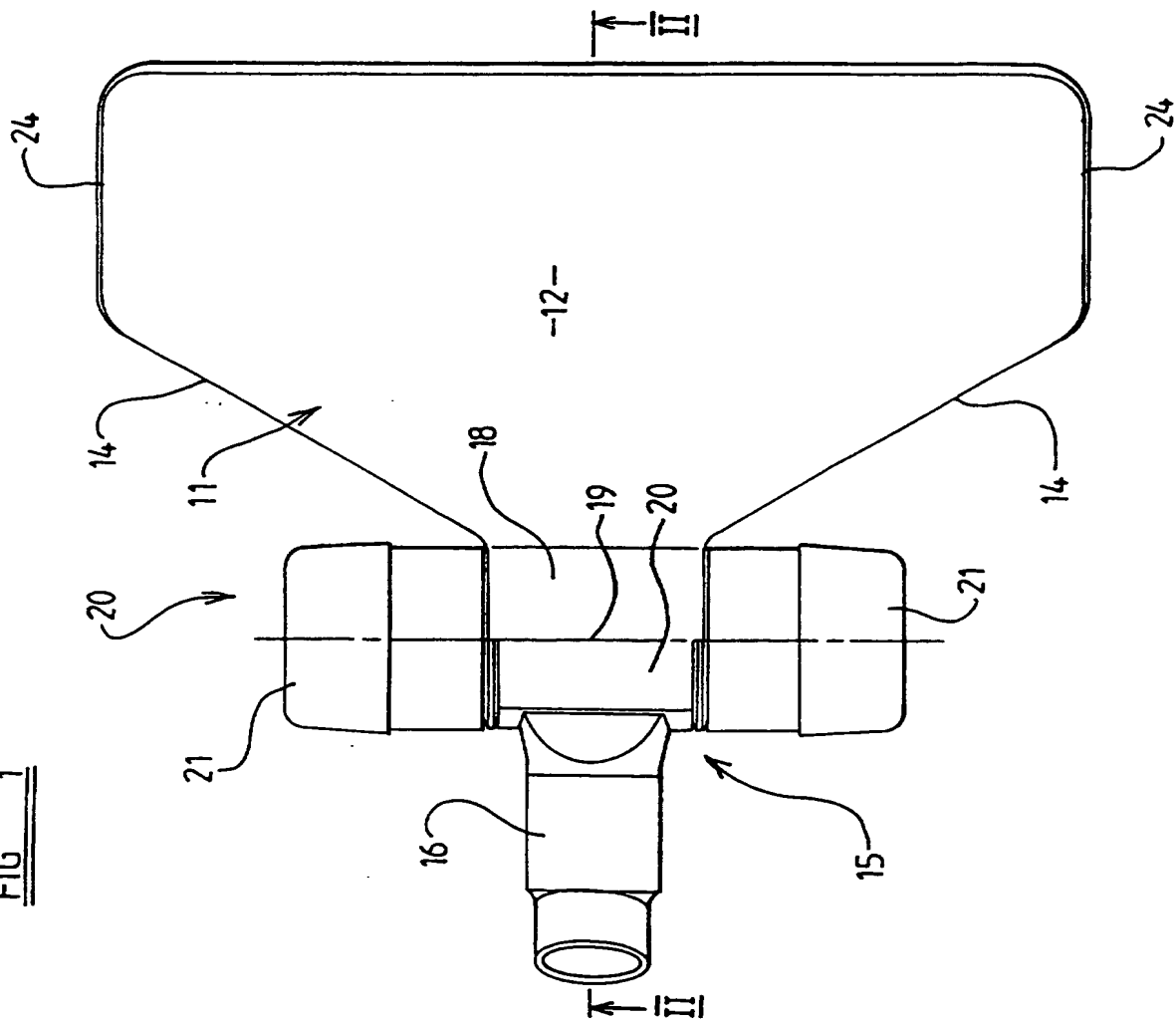


FIG 2

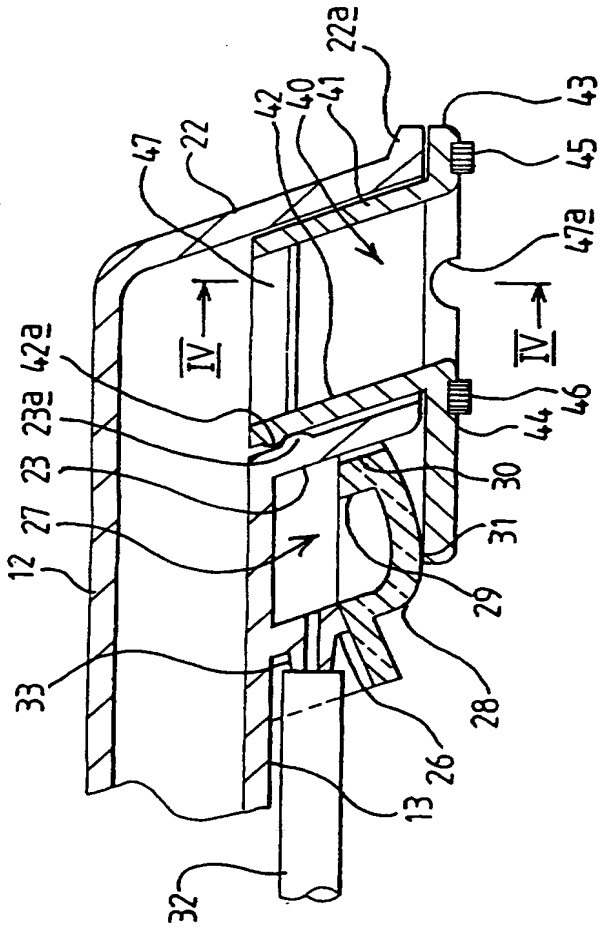


FIG 3

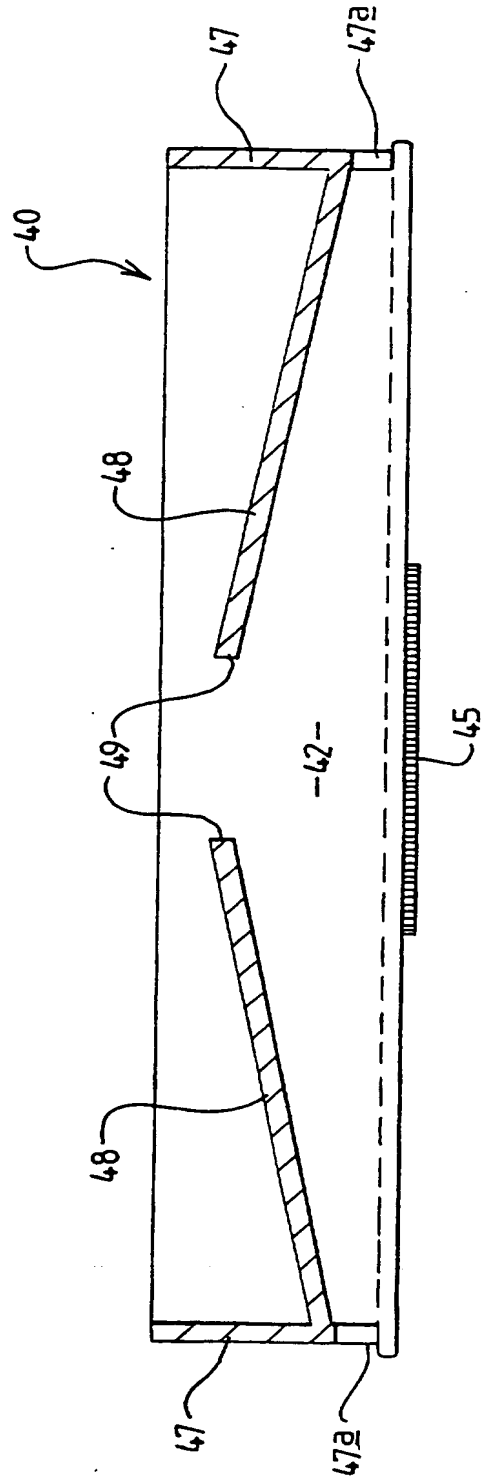


FIG 4

Title : Cleaning heads and adaptors for use therewith

Description of Invention

This invention relates to cleaning heads, for use with or as part of an apparatus for cleaning a surface by application of a cleaning liquid to the surface and removal of the cleaning liquid from the surface by suction.

More particularly, the invention relates to such cleaning heads suitable for use in such cleaning of floor surfaces or floor coverings which are of a generally fibrous and absorbent nature. Examples of materials commonly used for floors or floor coverings, and affording surfaces of the type with which the invention is intended to be used, include in particular carpets, rugs and matting, as well as carpet tiles. Such cleaning heads may also be used for cleaning upholstery and curtains or the like.

There have been many proposals for apparatus for cleaning such surfaces and materials by the application of a cleaning liquid (such as water containing a suitable detergent) thereto and removal of such liquid, together with dirt removed thereby from the surface by suction. Cleaning heads for such apparatus, which may be provided as part of single-purpose cleaning appliances or as accessories for multi-purpose cleaning appliances of the suction cleaner ("vacuum cleaner") type, usually include means for distributing the cleaning liquid on to the surface to be cleaned, and at least one passage arranged to be connected to a source of suction and having at least one opening arranged to collect liquid from the surface being cleaned.

Cleaning heads suitable for use on such materials and surfaces are disclosed, for example, in EP 0 316 849 and EP 0 551 358. However, such cleaning heads cannot normally be used for cleaning surfaces by picking up dry material, particularly from carpeted or upholstered surfaces, without the application of a cleaning liquid, and where an appliance is intended to be used both for wet and

for dry cleaning operations, it has been the practice in the past to provide separate and interchangeable heads to perform the respective functions.

This naturally adds to the overall cost of manufacture, and it is an object of the present invention to provide a cleaning head for use on fabric and like absorbent surfaces and which can readily be adapted for wet or for dry use by means of a user-removable and replaceable member, i.e. an adaptor.

It will be appreciated that a cleaning head in accordance with the invention normally is used in a predominantly reciprocating motion over the surface being cleaned. Accordingly references herein to the front and rear of the cleaning head, to the length thereof, and analogous expressions, refer to parts of the cleaning head spaced thereon in the intended direction of reciprocation thereof in use, and to dimensions in such direction. Similarly references to the sides of the cleaning head and to the width thereof, and analogous expressions, refer to the direction transverse to the direction of reciprocation of the cleaning head in normal use.

According to one aspect of the present invention, we provide a cleaning head for cleaning surfaces of fabric and like absorbent materials, comprising delivery means which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned, an air passage through the head having an open suction mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, and a removable adaptor for assembly with said cleaning head and which, when in place, effectively covers said liquid delivery passageways and fits within said mouth and includes an inlet opening maintaining communication between said surface and said air passage, thereby enabling the head to be operated in a dry mode to pick up solid matter from said surface.

The liquid delivery means and suction mouth of the cleaning head may comprise an assembly at the underside of the head to engage the surface to be cleaned, and said assembly may be of generally rectangular shape in plan view, with two opposed longer sides respectively at the front and rear of the assembly and two opposed shorter lateral sides, and in this case, preferably the mouth of said

air passage is disposed adjacent to said forward side of the head and is of elongated shape having forward and rearward edges extending transversely across the head, and said liquid distribution passageways are arranged in a line adjacent to said mouth at said rearward edge thereof, the assembly further comprising a smooth surface-engaging bottom wall which extends rearwardly of said liquid distribution passageways to the rear side of the assembly to facilitate movement of the head over the surface. The arrangement of the mouth to extend across substantially the entire width of the cleaning head, while being of relatively small dimensions in the direction lengthwise of the cleaning head enables a high velocity of air flow to be maintained to entrain liquid from the surface being cleaned, rendering collection of liquid highly effective.

The adaptor may then be formed with walls which are adapted to enter said mouth of the head and engage inner faces of the mouth to locate and secure the adaptor in position without the use of fastening elements. Preferably, said walls comprise at least forward and rearward walls arranged to extend along and the forward and rearward edges of the mouth. Detent formations may be provided to assist in retaining the adaptor in position.

The adaptor preferably includes a flange which extends rearwardly from the lower edge of the rearward wall and, in use, over said liquid distribution passageways. A similar flange may also be provided to extend forwardly from the lower edge of the forward wall.

The adaptor may further comprise end walls which interconnect said forward and rearward walls at the ends thereof, and said end walls may each be formed with a respective recess to allow air to flow inwardly into the head at the ends of said mouth. Alternatively, the end walls of the adaptor may terminate at a position spaced slightly above the lower edges of the forward and rearward walls for the same purpose.

The adaptor inlet opening is preferably arranged generally centrally of the width of the adaptor to extend across less than half the width of the head between said side walls of the head. Said inlet opening is preferably formed by a gap between a pair of upwardly convergent baffles which extend between said forward and rearward walls and inwardly from the opposite ends of the adaptor.

In a preferred arrangement, the adaptor may be provided with brushing elements at the underside of said forward and rearward flanges. Such brushing elements may comprise one or more rows of bristles, and/or pads of plush material.

According to another aspect of the invention, we provide an adaptor for use with a cleaning head for cleaning surfaces of fabric and like absorbent materials, and comprising delivery means which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned, and an air passage through the head having an open mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, wherein the adaptor comprises upwardly directed walls adapted to enter said mouth of the head and engage inner faces of the mouth to locate and secure the adaptor in position without the use of fastening elements, an inlet opening adapted to maintain communication between said surface and said air passage, and a flange which, in use, extends over said liquid distribution passageways, thereby adapting the head for picking-up dry material from the surface.

According to a further aspect of the present invention we provide a vacuum cleaner of the kind comprising a cleaning head adapted for cleaning surfaces of fabric and like absorbent materials and connected to a source of suction to establish suction at said cleaning head and air flow from said head to said source of suction, alternatively operable separator units including a wet-mode separator unit which operates to separate entrained liquid droplets from the air flow, and a dry-matter separator unit which operates to separate solid matter entrained in the air flow, and a collection container within a body of the container to receive matter separated from the air flow by said separator in use, wherein said cleaning head comprises delivery means which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned, an air passage through the head having an open mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, and a removable

adaptor is provided for assembly with said cleaning head and which, when in place, effectively covers said liquid delivery passageways and fits within said mouth whilst maintaining communication between said surface and said air passage, thereby enabling the head to be operated in a dry mode to pick up solid matter from said surface.

The invention will now be described by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a plan view of a cleaning head for wet suction cleaning of a kind with which an adaptor in accordance with the invention can be employed;

Figure 2 is a longitudinal section on the centre-line of the head of Figure 2;

Figure 3 is a similar section showing one embodiment of adaptor in accordance with the invention in place; and

Figure 4 is a section on the line III-III of Figure 3.

Referring to the drawings, the cleaning head as illustrated is intended to form part of a multi-purpose cleaning appliance of the suction cleaner type, for example as shown in Figures 4 and 5 of our International Patent application WO 97/29675, thereby making such cleaner suitable for use in cleaning carpets and similar floor coverings, rather than the hard surfaces on which that appliance is intended to be used. However, it will be appreciated that the invention can be applied to cleaning heads that are either mounted as illustrated therein directly at the lower end of an appliance which is used in a generally upright or inclined orientation, or connected at the free end of a suction hose from a free-standing appliance.

The cleaning head 10 as illustrated comprises a housing 11 comprising a generally horizontal top and bottom walls 12 and 13, and forwardly diverging side walls 14. An articulated connection 15, is provided at the rear of the head for the lower end of a spigot 16 which is configured for attachment of the cleaning head to an appliance as shown in Figures 4 and 5 of said International Patent Specification, or to, for example, the hose of a suction cleaning appliance. The spigot 16 is thus able to pivot about a transverse horizontal axis at the rear of the head 10. The top and bottom walls 12 and 13 between them define a passage 17

for air flow which communicates with the spigot 16 through the articulated connection 15.

The articulated connection 15 includes a transversely extending cylinder 18 which forms the rear portion of the housing 11, and has a slot 19 formed therein, and a pair of part-cylindrical walls 20 carried by the spigot 16 and movably located within cylinder 18 within angular limits imposed by the slot 19. The cylinder 18 extends outwardly of the articulated connection and at its outer ends carries respective rollers 21 to support the rear of the head 10.

At its forward end, the top wall 12 of the housing 11 terminates in a housing front wall 22 which extends downwardly to approximately the level of the rollers 21 and carries a flat lip 22a. The bottom wall 13 terminates rearwardly of the front wall 22 in a downwardly extending intermediate wall 23 which terminates at a level slightly above that of the front wall 22. The walls 22 and 23 in combination with forward extensions 24 of the side walls 14 define a suction slot 25 which extends across the full width of the head and affords a downwardly facing mouth 26 adjacent to the front wall 22 of the head.

Rearwardly of the wall 23, the bottom wall 13 at its underside carries a rearward wall 26 parallel to and spaced from the wall 23. The intermediate wall 23 and the rearward wall 26 in combination define a liquid distribution chamber 27 which is closed at its underside by a closure strip 28. At its forward edge the strip 28 is formed with a thickened bead 29 having a plurality of fine grooves 30 formed at regularly spaced intervals along its length so as to allow liquid to flow in a controlled manner from the chamber 27 into the space behind the lower edge of the intermediate wall 23. The underside of the strip 28 affords a smooth face 31 to assist in movement of the head over the surface being cleaned.

Liquid is supplied to the chamber 27 through a pipe 32 connected to an inlet spigot 33.

The head as described and illustrated in Figures 1 and 2 is thus adapted to be used for cleaning carpets or other similar floor coverings by the application of a cleaning liquid through chamber 27 and simultaneous pick-up of the liquid by means of the suction slot 24.

In accordance with the invention an adaptor 40 is provided to convert

the head for dry suction cleaning. The adaptor comprises an insert to fit into the suction slot 24 and cover at least the outlet of the liquid delivery chamber 27 formed by the grooves 30.

The adaptor as shown by way of example in Figure 3 and 4 comprises a moulding having forward and rearward walls 41, 42 spaced apart by a distance such as to enable them to be introduced into the suction slot 24 in face-to-face relation with the opposing faces of the front wall 22 and intermediate wall 23. A rib 23a may be formed at the forward side of the intermediate wall 23 to engage above a complementary rib 42a formed at the rearward face of the rearward wall 42 and assist in holding the adaptor releasably in place.

At its lower edge the forward wall 41 carries a forwardly extending flange 43 to engage beneath the lip 22a. Likewise, at its lower edge the rearward wall 42 carries a rearwardly directed flange 44 which extends beneath the lower end of the intermediate wall 23 and covers the grooves 30. The flanges 43 and 44 may carry at their undersides strips 45, 46 of plush material or the like.

The forward and rearward walls 41, 42 are connected at their outer ends by end walls 47, and by baffles 48 which extend inwardly and upwardly between the walls 41, 42 from the side walls 47 to a gap 49 at the centre of the adaptor. The end walls 47 may have recesses 47a formed therein below the baffles 48 to permit air to be drawn into the suction chamber at the ends thereof and assist in drawing particulate material towards the gap 49.

When the adaptor 40 is in place as shown in Figure 3 the head 10 can be used for dry suction cleaning without any other adaptation of the head being required.

The features disclosed in the foregoing description, or the accompanying drawing, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS:

1. A cleaning head for cleaning surfaces of fabric and like absorbent materials, comprising
 - a) delivery means which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned,
 - b) an air passage extending through the head and having an open suction mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, and
 - c) a removable adaptor for assembly with said cleaning head and, when in place, effectively covers said liquid delivery passageways and fits within said mouth, and includes an inlet opening maintaining communication between said surface and said air passage, thereby to enable the head to be operated in a dry mode to pick up solid matter from said surface.
2. A cleaning head according to Claim 1 wherein said liquid delivery means and said suction mouth comprise an assembly at the underside of the head for engagement with the surface to be cleaned.
3. A cleaning head according to Claim 2 wherein said assembly is of generally rectangular shape in plan view, with two opposed longer sides respectively at the front and rear of the assembly and two opposed shorter lateral sides.
4. A cleaning head according to Claim 3 wherein said suction mouth of said air passage is disposed adjacent to said front of said assembly and is of elongated shape having forward and rearward edges extending transversely across the head, and said liquid distribution passageways are arranged in a line adjacent to

said mouth at said rearward edge thereof.

5. A cleaning head according to Claim 4 wherein said assembly further comprises a smooth surface-engaging bottom wall which extends rearwardly of said liquid delivery passageways to the rear of said assembly to facilitate movement of the head over the surface.
6. A cleaning head according to Claim 4 wherein the adaptor means is formed with walls which are adapted to enter said suction mouth and engage inner faces of said mouth to locate and secure the adaptor means in position without the use of fastening elements.
7. A cleaning head according to Claim 6 wherein said walls comprise at least forward and rearward walls arranged to extend along the forward and rearward edges of said suction mouth.
8. A cleaning head according to Claim 7 wherein detent formations are provided to assist in retaining the adaptor in position within said mouth.
9. A cleaning head according to Claim 7 wherein the adaptor means includes a flange which extends rearwardly from the lower edge of the rearward wall and, in use, over said liquid delivery passageways.
10. A cleaning head according to Claim 9 wherein the adaptor means includes a further flange which extends forwardly from the lower edge of the forward wall.
11. A cleaning head according to Claim 4 wherein the adaptor means further comprises end walls which interconnect said forward and rearward walls at the ends thereof.
12. A cleaning head according to Claim 11 wherein said end walls are each

formed with a respective recess to allow air to flow inwardly into the head at the ends of said suction mouth.

13. A cleaning head according to any one of claims 6 to 12 wherein said inlet opening of the adaptor means is arranged generally centrally of the width of the adaptor means and extends across less than half the width of the cleaning head.
14. A cleaning head according to Claim 13 wherein said adaptor means includes a pair of upwardly convergent baffles which extend between said forward and rearward walls and inwardly from the opposite ends of the adaptor means and said inlet opening is formed by a gap between said baffles.
15. A cleaning head according to Claim 10 wherein the adaptor means is provided with brushing elements arranged at the underside of said flanges at the lower edges said forward and rearward walls.
16. A cleaning head according to Claim 15 wherein said brushing elements comprise one or more rows of bristles, and/or pads of plush material.
17. An adaptor for use with a cleaning head for cleaning surfaces of fabric and like absorbent materials, which cleaning head comprises
 - a) delivery means which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned, and
 - b) an air passage through the head and having an open mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, wherein the adaptor comprises
 - c) upwardly directed walls adapted to enter said suction mouth of the head and engage inner faces of the mouth to locate and secure the adaptor means in position without the use of fastening elements,
 - d) an inlet opening adapted to maintain communication between said

surface and said air passage means, and

e) a flange which, when the adaptor means is in use, extends over said liquid delivery passageways, thereby adapting the head for picking-up dry material from the surface.

18. A vacuum cleaner of the kind comprising

a) a cleaning head adapted for cleaning surfaces of fabric and like absorbent materials and connected to a source of suction to establish suction at said cleaning head and to establish an air flow from said head to said source of suction,

b) alternatively operable separator units including a wet-mode separator unit which operates to separate entrained liquid droplets from the air flow, and a dry-matter separator unit which operates to separate solid matter entrained in the air flow, and

c) a collection container within a body of the container to receive matter separated from the air flow by said separator in use,

d) delivery means in said cleaning head which include a plurality of spaced liquid delivery passageways for delivering a cleaning liquid to the surface to be cleaned,

e) an air passage through said cleaning head and having an open suction mouth adjacent to said liquid delivery passageways for applying suction to said surface for the collection of liquid from said surface thereby enabling the head to be operated in a wet mode in which liquid is applied to, and picked up from, the surface, and

f) a removable adaptor for assembly with said cleaning head and, when in place, effectively covers said liquid delivery passageways and fits within said suction mouth whilst maintaining communication between said surface and said air passage means, thereby enabling the head to be operated in a dry mode to pick up solid matter from said surface.



Application No: GB 9824745.5
Claims searched: 1-18

Examiner: Annabel Ovens
Date of search: 2 March 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): A4F (FK, FSLA, FSLX, FSNS, FSNX)

Int Cl (Ed.7): A47L (7/00, 9/00, 9/02, 9/06)

Other: Online: PAJ, EPODOC, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X, Y	WO 97/29675 (VAX LIMITED) see page 2 line 23-page 3 line 12, page 8 lines 6-8, page 9 lines 19-23, page 10 lines 7-9 and Figs. 2 and 3	X: 1-5 and 11 Y: 6-10 and 17
Y	US 4475265 (BERFIELD) see column 2 lines 35-39 and 46-48 and Fig. 6	6, 7 and 17
Y	US 4413372 (BERFIELD) see column 2 lines 5-26 and Figs. 5 and 6	8-10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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